

251 HW 2 1.1, 1.2, 1.5, 1.6 1

1.1 | a) series 15k b) $\frac{5(10)}{15} = 3.33k$ ← 2 5ks in parallel

1.2 | $P = IV$ $I = \frac{V}{R}$ $P = \frac{V^2}{R} = 144W$

1.5 | $P = IV = \frac{V^2}{R}$ in series with battery
 $\frac{15^2}{1000} = 0.225W$

1.6 | $R = 5 \times 10^{-8} \frac{\Omega}{ft}$ $V = IR$ $I = \frac{V}{R} = \frac{115}{5 \times 10^{-8}}$

a) $P = IV$ $I = \frac{P}{V} = 8.7 \times 10^7 A$

$$I^2 R = (8.7 \times 10^7)^2 5 \times 10^{-8} \frac{\Omega}{ft} = 3.8 \times 10^8 \frac{W}{ft}$$

b) $\frac{10^{10} W}{3.8 \times 10^8 \frac{W}{ft}} = 26.5 ft$

c) $P = \sigma T^4$

$$T = 2 \times 10^5 K$$

$$\frac{P}{A} = \sigma T^4$$

1 foot = 0.30 m

$$r = 0.15m = 15cm$$

$$L = 26.5ft = 807cm$$

$$\frac{10^{10}}{\pi (15)^2 \cdot 900} = 6 \times 10^{-12} T^4$$

$$T = 7154 K$$

$$\frac{10^{10}}{2\pi r \cdot L} = \sigma T^4$$

$$T = 12167 K$$